

## **LISTING OF THE CLAIMS**

This listing of claims will replace all prior versions, and listings, of claims in the application:

### **Claims 1 and 2 (canceled)**

### **Claim 3 (currently amended)**

~~The component-placing apparatus according to Claim 1,~~ A component-placing apparatus for driving a suction nozzle in the rotational ( $\theta$ ) and vertical (Z) directions for applying suction to a component, comprising:

a rotary actuator;

a linear actuator comprising a stator connected to a stator of the rotary actuator such that these stators are immovable relative to each other;

a spline shaft connected to a rotating shaft of the rotary actuator;

a nozzle connecting shaft connected to the spline shaft for being allowed to move only rectilinearly in the longitudinal direction of the spline shaft relative to the spline shaft and having the suction nozzle disposed at the bottom thereof;

a hollow holder encircling the nozzle connecting shaft with rotary bearings being interposed therebetween which allow the nozzle connecting shaft to rotate with the spline shaft and connected for being driven by a mover of the linear actuator; and

a linear guide for guiding the hollow holder relative to the stators of the actuators so as to be rectilinearly movable parallel to the spline shaft;

wherein the mover and the stator of the linear actuator have a return spring disposed therebetween for urging the mover upwards, the return spring having a spring force which is slightly greater than the sum of the weight load of a moving part of the apparatus including the mover, the suction nozzle, and the nozzle connecting shaft, and a sliding frictional force generated between the linear guide and the spline shaft.

### **Claim 4 (currently amended)**

~~The component-placing apparatus according to Claim 1,~~ A component-placing apparatus for

driving a suction nozzle in the rotational ( $\theta$ ) and vertical (Z) directions for applying suction to a component, comprising:

a rotary actuator;

a linear actuator comprising a stator connected to a stator of the rotary actuator such that these stators are immovable relative to each other;

a spline shaft connected to a rotating shaft of the rotary actuator;

a nozzle connecting shaft connected to the spline shaft for being allowed to move only rectilinearly in the longitudinal direction of the spline shaft relative to the spline shaft and having the suction nozzle disposed at the bottom thereof;

a hollow holder encircling the nozzle connecting shaft with rotary bearings being interposed therebetween which allow the nozzle connecting shaft to rotate with the spline shaft and connected for being driven by a mover of the linear actuator; and

a linear guide for guiding the hollow holder relative to the stators of the actuators so as to be rectilinearly movable parallel to the spline shaft;

wherein the hollow holder and the nozzle connecting shaft have a sealed chamber formed in a space therebetween;

the nozzle connecting shaft has an air passage formed therein for transmitting a pressure medium in to the chamber to from the suction nozzle;

an air port in communication with the chamber is formed in the outer surface of the hollow holder, and

the air port is ~~connected~~ connectable to a vacuum suction apparatus for causing said transmission of said pressure medium.

#### **Claims 5 and 6 (canceled)**

#### **Claim 7 (currently amended)**

~~The component-placing apparatus according to Claim 5;~~ A component-placing apparatus for driving a suction nozzle in the rotational ( $\theta$ ) and vertical (Z) directions for applying suction to a component, comprising:

a rotary actuator having a rotating shaft;  
a linear actuator comprising a stator connected to a stator of the rotary actuator such that  
these stators are immovable relative to each other;  
a nozzle connecting shaft having the suction nozzle disposed at the bottom thereof;  
the nozzle connecting shaft being connected to the rotating shaft by a coupling which  
allows the nozzle connecting shaft to move only rectilinearly in the longitudinal direction of the  
rotating shaft, relative to the rotating shaft;  
a hollow holder encircling the nozzle connecting shaft with rotary bearings being  
interposed therebetween which allow the nozzle connecting shaft to rotate and connected for  
being driven by a mover of the linear actuator; and  
a linear guide for guiding the hollow holder relative to the stators of the actuators so as to  
be rectilinearly movable parallel to the rotating shaft;

wherein the mover and the stator of the linear actuator have a return spring disposed therebetween for urging the mover upwards, the return spring having a spring force which is slightly greater than the sum of the weight load of a moving part of the apparatus including the mover, the suction nozzle, and the nozzle connecting shaft, and a sliding frictional force generated at the linear guide and at said coupling.

**Claim 8 (currently amended)**

~~The component-placing apparatus according to Claim 5;~~ A component-placing apparatus for driving a suction nozzle in the rotational ( $\theta$ ) and vertical (Z) directions for applying suction to a component, comprising:

a rotary actuator having a rotating shaft;  
a linear actuator comprising a stator connected to a stator of the rotary actuator such that  
these stators are immovable relative to each other;  
a nozzle connecting shaft having the suction nozzle disposed at the bottom thereof;  
the nozzle connecting shaft being connected to the rotating shaft by a coupling which  
allows the nozzle connecting shaft to move only rectilinearly in the longitudinal direction of the  
rotating shaft, relative to the rotating shaft;

a hollow holder encircling the nozzle connecting shaft with rotary bearings being interposed therebetween which allow the nozzle connecting shaft to rotate and connected for being driven by a mover of the linear actuator; and

a linear guide for guiding the hollow holder relative to the stators of the actuators so as to be rectilinearly movable parallel to the rotating shaft;

wherein the hollow holder and the nozzle connecting shaft have a sealed chamber formed in a space therebetween;

the nozzle connecting shaft has an air passage formed therein for transmitting a pressure medium in to the chamber to from the suction nozzle;

an air port in communication with the chamber is formed in the outer surface of the hollow holder, and

the air port is ~~connected~~ connectable to a vacuum suction apparatus for causing said transmission of said pressure medium.

#### **Claim 9 (new)**

The component-placing apparatus according to Claim 3, wherein said linear actuator is a voice-coil motor.

#### **Claim 10 (new)**

The component-placing apparatus according to Claim 7, wherein said linear actuator is a voice-coil motor.

#### **Claim 11 (new)**

The component-placing apparatus according to Claim 3, wherein said return spring is a tension spring.

#### **Claim 12 (new)**

The component-placing apparatus according to Claim 7, wherein said return spring is a tension spring.

**Claim 13 (new)**

The component-placing apparatus according to Claim 4, wherein said sealed chamber is defined between a pair of seals disposed between said hollow holder and said nozzle connecting shaft.

**Claim 14 (new)**

The component-placing apparatus according to Claim 13, wherein said pair of seals are both disposed between said rotary bearings.

**Claim 15 (new)**

The component-placing apparatus according to Claim 13, wherein each said seal comprises a low-friction sealing ring which engages said nozzle connecting shaft.

**Claim 16 (new)**

The component-placing apparatus according to Claim 15, wherein said low-friction sealing ring is a resin ring.

**Claim 17 (new)**

The component-placing apparatus according to Claim 15, wherein each said seal further comprises a compressible sealing ring disposed between said low-friction sealing ring and said hollow holder.

**Claim 18 (new)**

The component-placing apparatus according to Claim 17, wherein said low-friction sealing ring is a resin ring and said compressible sealing ring is a rubber ring.

**Claim 19 (new)**

The component-placing apparatus according to Claim 13, further comprising a respective pair of seal stoppers arranged for holding said pair of seals in place in said hollow holder.

**Claim 20 (new)**

The component-placing apparatus according to Claim 8, wherein said sealed chamber is defined between a pair of seals disposed between said hollow holder and said nozzle connecting shaft.

**Claim 21 (new)**

The component-placing apparatus according to Claim 20, wherein said pair of seals are both disposed between said rotary bearings.

**Claim 22 (new)**

The component-placing apparatus according to Claim 20, wherein each said seal comprises a low-friction sealing ring which engages said nozzle connecting shaft.

**Claim 23 (new)**

The component-placing apparatus according to Claim 22, wherein said low-friction sealing ring is a resin ring.

**Claim 24 (new)**

The component-placing apparatus according to Claim 22, wherein each said seal further comprises a compressible sealing ring disposed between said low-friction sealing ring and said hollow holder.

**Claim 25 (new)**

The component-placing apparatus according to Claim 24, wherein said low-friction sealing ring is a resin ring and said compressible sealing ring is a rubber ring.

**Claim 26 (new)**

The component-placing apparatus according to Claim 20, further comprising a respective pair of seal stoppers arranged for holding said pair of seals in place in said hollow holder.